



Short Sleep Duration and Associated Risk Factors Among Adolescents in Oklahoma

INTRODUCTION

Getting the recommended hours of sleep each night is a public health concern for everyone, regardless of age. A number of studies have shown that for adolescents, inadequate sleep is common and can negatively impact academic performance and lead to other behavioral and health consequences, such as increased injuries, hypertension, obesity, diabetes, and depression, especially for teens who may experience increased risk of self-harm or suicidal thoughts.^{1,2,3} Research has also indicated that adolescents from families with low income or of racial or ethnic minorities may be at even greater risk of poor-quality and insufficient sleep.³ In 2010, the American Medical Association and the American Academy of Sleep Medicine in a joint resolution recognized insufficient sleep in adolescents as a serious health risk and a new topic specifically including reducing adolescent sleep loss was added to the Healthy People 2020 Objectives, “SH-3: Increase the proportion of students in grades 9 through 12 who get sufficient sleep” (defined as ≥ 8 hours).³ The purpose of this report was to analyze self-reported sleep duration and associated risk factors among public high school students in Oklahoma.

METHODS

Data from the 2019 Oklahoma Youth Risk Behavior Survey (YRBS) were used for this report. The statewide, randomized YRBS is conducted biennially on odd-numbered years. The sample was selected using a two-stage sampling design. Schools were first selected for participation based on probability proportional to enrollment. Classes were then selected from each school using systematic equal probability sampling with a random start. The sample was weighted to be representative of Oklahoma public high school students in grades 9 through 12 based on the demographic distribution of the enrolled student population provided by the Oklahoma State Department of Education. For the 2019 YRBS, 2,008 questionnaires were completed in 44 out of 50 public high schools for a school participation rate of 88%, a student participation rate of 86%, and an overall response rate of 75%. Sleep duration was based on the student’s self-reported hours of sleep on an average school night.

Students who got eight or more hours of sleep per night were less likely than students who got less than eight hours of sleep to have felt sad or hopeless, experienced suicidal ideation, or to have used marijuana or alcohol recently.

RESULTS

Table 1 shows the number of hours of sleep achieved on an average school night among public high school students in Oklahoma with 29.1% getting 7 hours of sleep, 25.0% getting 6 hours of sleep, 16.2% getting 8 hours of sleep, 15.6% getting 5 hours of sleep, 9.2% getting 4 or less hours of sleep, 3.5% getting 9 hours of sleep, and 1.4% getting 10 or more hours of sleep.

Table 1. Hours of Sleep per Average School Night: Oklahoma YRBS 2019

Hours of Sleep	n ¹	Weighted % ²
4 or less hours	178	9.2
5 hours	288	15.6
6 hours	486	25.0
7 hours	574	29.1
8 hours	323	16.2
9 hours	71	3.5
10 or more hours	26	1.4
Total	1,946	100.0

1 unweighted sample size

2 representative of all public school 9-12 graders

Just over one-fifth (21.1%) of students met the recommended guidelines of getting 8 or more hours of sleep on an average school night (Table 2). This is a statistically significant decrease from 28.2% observed in 2015 and from 26.8% in 2017. Differences were observed by gender as females (18.5%) were less likely than males (23.3%) to get 8 or more hours of sleep, $p=0.01$. Differences were also observed by grade as younger students were more likely than older students to get 8 or more hours of sleep, $p<.0001$. No statistically significant differences were observed by race/ethnicity.

Table 2. Achieved Recommended Hours of Sleep (8 or more hours) by Demographic Characteristics: Oklahoma YRBS 2019

	Weighted % ¹	p-value ²
Gender		
Female	18.5	0.01
Male	23.3	
Grade	%	p-value
9th	26.9	<.0001
10th	25.5	
11th	17.0	
12th	13.2	
Race	%	p-value
Multiple races	18.9	0.3933
Hispanic	21.3	
Native American	21.9	
Black	20.9	
Asian	12.9	
White	21.7	
Total	21.1	

1 Representative of all public school 9-12 graders

2 Rao-Scott Chi-squared test

When examining sleep duration with other health risk behaviors, significant associations were observed (Table 3). Students who got eight or more hours of sleep per night were less likely than students who got seven or fewer hours of sleep to have felt sad or hopeless ($P<.0001$), to have experienced suicidal ideation ($p=0.0007$), to have taken a prescription pain medication without a doctor's prescription or other than prescribed ($p=0.0125$), to have ever used drugs ($p=0.0127$), to have drunk alcohol recently ($p=0.0006$), to have used marijuana recently ($p=0.0007$), and to have played 3 or more hours of computer or video games per day ($p=0.0217$).

RESULTS CONTINUED

Table 3. Bivariate Associations between Recommended Hours of Sleep and Selected Risk Indicators: Oklahoma YRBS 2019

		Got 8 or more hours of sleep % ¹		
		Yes	No	p-value ²
Felt sad or hopeless	Yes	24.1	42.5	<.0001
	No	75.9	57.5	
Suicidal ideation	Yes	22.6	32.2	0.0007
	No	77.4	67.8	
Misused prescription pain medication	Yes	10.9	17.2	0.0125
	No	89.1	82.8	
Ever Drug Use	Yes	11.4	17.7	0.0127
	No	88.6	82.3	
Obese ³	Yes	14.5	18.3	0.255
	No	85.5	81.7	
Drank Alcohol Recently	Yes	17.9	30.0	0.0006
	No	82.1	70.0	
Used Marijuana Recently	Yes	10.9	18.9	0.0007
	No	89.1	81.1	
2 or more sodas per day	Yes	12.3	14.8	0.353
	No	87.7	85.2	
No physical activity any day	Yes	14.4	15.5	0.0845
	No	88.6	84.5	
3 or more hours of TV per day	Yes	21.1	22.4	0.6767
	No	78.9	77.6	
3 or more hours of video per day	Yes	41.7	49.6	0.0217
	No	58.3	50.4	
Mostly A's or B's in school	Yes	87.7	77.4	0.0002
	No	12.3	22.6	

1 representative of all public school 9-12 graders

2 p-value= Rao-Scott Chi-Squared test

3 Body Mass Index (BMI) ≥ 30

RESULTS CONTINUED

Students who got eight or more hours of sleep per night were more likely than students who got seven or fewer hours of sleep per night to make grades of mostly A's and B's ($p=0.0002$).

Those variables that were not significant with the dichotomized sleep variable of eight or more hours of sleep vs seven or fewer hours of sleep were also examined with a dichotomized sleep variable of five or fewer hours of sleep and six or more hours of sleep. Students who slept five or fewer hours on an average school night were more



likely than students who slept six or more hours to be obese (20.5% vs 16.5%), to drink 2 or more sodas per day (19.5% vs 12.5%), to not be physically active on any day (19.2% vs 13.1%), and to have watched 3 or more hours of TV per day at 28.2% and 20.2%, respectively.

LIMITATIONS

The YRBS is a cross-sectional study; therefore, the measured associations reflect one point in time and do not imply a causal relationship. These data were representative of public school students in grades 9 through 12 in Oklahoma. Adolescents who attended private institutions, were home-schooled, or did not attend any school were not represented in this study. There is potential underreporting of risk behaviors by students participating in the YRBS. Despite efforts to conduct the YRBS in such a manner as to preserve confidentiality, some students may not report events if they feel their answers will in some way identify them. Furthermore, students read and interpret the questions and form their answers without any external assistance; therefore, students may have different interpretations of the YRBS questions and response options.

DISCUSSION

Sufficient sleep is an integral component of a healthy lifestyle. However, there are several factors that contribute to adolescent sleep-loss, including social media, poor diet quality and excess food intake, and environment.⁴ This report suggests that adhering to the recommended amount of sleep for their age could positively impact adolescents' academic performance and overall well-being. This study showed that students who got eight or more hours of sleep per night were less likely than students who got seven or fewer hours of sleep per night to have felt sad or hopeless, to have experienced suicidal ideation, to have taken a prescription pain medication without a doctor's prescription, to have ever used drugs, to have drunk alcohol recently, to have used marijuana recently, and to have played three or more hours of computer or video games per day and were more likely to have A's and B's in school.

Inadequate sleep is defined as less than 8 hours of sleep for students in grades 9 through 12 and is associated with poor academic performance and behavioral and health consequences, such as increased injuries, hypertension, obesity, diabetes, and depression.^{1,3} These findings suggest that factors influencing adolescent sleep are pervasive in their impact across diverse demographic groups: gender, age, and race. For example, females (18.5%) were less likely than males (23.3%) to get eight or more hours of sleep. Younger students were more likely than older students to get eight or more hours of sleep. This study suggests that although adolescents' socio-economic status impacts their sleep duration, education on the importance of sufficient sleep is still needed considering the physiological and psychological impacts of sleep-loss on adolescent health, parents and caregivers can support good sleep habits by adhering to the recommendations below.

RECOMMENDATIONS

1. Encourage and empower teenagers 13-18 years of age to get 8 to 10 hours of sleep a night.^{2,7,8}
2. Reduce screen time, especially late in the evening, as blue light from televisions, computers, electronic notebooks, and smartphones can inhibit the release of sleep-inducing melatonin, increase alertness, and reset the body's circadian rhythm to a later schedule.⁶
3. Plan ahead so that homework that needs to be done on a screen is completed by early evening and "off-screen" work is saved for later.⁶
4. Be consistent. Try to go to bed and get up at the same times, including weekends.¹⁰
5. Make sure the bedroom is quiet, dark, relaxing, and at a comfortable temperature.¹⁰
6. Get some exercise. Being active during the day can help you fall asleep more easily at night.¹⁰
7. Don't eat, drink, or exercise within a few hours of bedtime. Nicotine and alcohol also interfere with sleep.⁶
8. Avoid caffeine containing drinks and medications (coffee, tea, soda/pop and chocolate) 4-6 hours before bedtime since caffeine acts as a stimulant and can reduce the quantity and quality of sleep.⁹
9. Encourage schools to move toward later starting times (the AAP recommends ~ 8:30 a.m.), since research indicates that typical teens have trouble falling asleep before 11:00 pm and are best suited to awaken at 8:00 or later.¹¹

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